

NASA TECH BRIEF



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Improved Cure Method for Single Component Silicone Rubber

The problem:

A widely used single component type of silicone rubber cures by adsorbing water vapor from the air which activates a catalyst system based on acetic anhydride. This material cannot be used in thick sections because of the very long curing time required. A method was needed to cure relatively thick sections of single component silicone rubber at room temperature within 12 to 48 hours even when this elastomer is enclosed by metal or plastic.

The solution:

Water was incorporated in a carrier or encapsulant, such as finely divided silica gel, and then thoroughly mixed with the single component silicone rubber containing acetic anhydride as a curing agent. Controlled, uniform curing ensued within a reasonable period of time, regardless of the thickness of the material, because curing occurred with the water supplied internally. This rubber remained malleable during the mixing process and could be used in locations where it was enclosed by metal, plastic, or other covering. It could be used as a potting material, sealant, or encapsulant of any thickness.

How it's done:

About five percent water by weight is incorporated in the 60-80 mesh silica gel carrier. The total amount of water mixed via carrier with the single component silicone rubber containing approximately 0.1 millimole of acetic anhydride per gram of rubber must be

within the range of about one and one-half to ten times the stoichiometric amount required for the curing reaction. The speed of the curing reaction may be adjusted by varying the percentage of water in the carrier and the total amount of water added. Test samples remained easily malleable while being stirred and, when molded in containers such that each sample was at least a one inch cube, cured completely in 24 hours.

Notes:

1. The benefits of this improved cure method may be utilized with other water-curable materials. Other carriers for the water may be used, and the grain or particle size of each carrier may be varied to regulate the cure rate.
2. Requests for further information may be directed to:
Technology Utilization Officer
Manned Spacecraft Center, Code BM7
Houston, Texas 77058
Reference: TSP69-10749

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

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